Grade 6 Standards and Learning Activities

Strand: Number Sense and Operations

NUMBER SENSE

6.NSO–N.1. Explain the properties of and compute with rational numbers, expressed in a variety of forms.

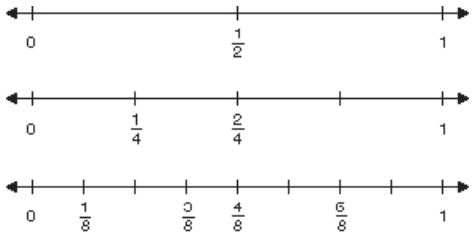
Example: Compute each of the following quantities:

$A = 6.2 + \frac{3}{5}$ $B = 6.2 \times \frac{3}{5}$ $C = \frac{1}{10} + \frac{3}{5}$ $D = 3.2 + 3.05$

(See also 6.NSO-N.4, 6.NSO-N.5, 6.NSO-C.10, 6.NSO-C.11, 6.NSO-C.12)

6.NSO–N.2. Compare and order positive and negative fractions, decimals, and mixed numbers and place them on a number line.

Example: Fill in the missing fractions on these number lines.



6.NSO–N.3. Know that numbers and their opposites add to 0 and are on opposite sides and at equal distance from 0 on a number line; know that 0 is an integer that is neither negative nor positive.

6.NSO–N.4. Represent rational numbers as repeating or terminating decimals when possible, and translate between these representations.

Examples: Express 1/11 as a repeating decimal. Express 1/8 as a repeating decimal.

6.NSO–N.5. Identify and determine common equivalent fractions, mixed numbers, decimals, and percentages.

Example: Look at the following four fractions:

27/12 4/3 36/27 20/15

Three of the fractions are equivalent in the sense that they can all be simplified to the same fraction. Which fraction is not equal to the others?

(See also 6.NSO-N.2)

6.NSO–N.6. Apply number theory concepts — including prime and composite numbers; prime factorization; greatest common factor; least common multiple; and divisibility rules for 2, 3, 4, 5, 6, 9, and 10 — to the solution of problems.

Example: Circle the number(s) in the following list that are divisible by 3.

35 43 51 60 111 160 4,380

6.NSO–N.7. Round whole numbers and decimals to any given place.

Strand: Number Sense and Operations *(continued)*

COMPUTATION AND OPERATIONS

6.NSO–C.8. Select and use appropriate operations to solve problems involving addition, subtraction, multiplication, division, and positive integer exponents with whole numbers and with positive fractions, mixed numbers, decimals, and percentages.

Example: Suppose that when a positive number **n** *is divided by 7, the result is* **a**, *and when the same number is divided by 8, the result is* **b**. *How do* **a** *and* **b** *compare?*

A) a < b

B) a = b

C) a > b

D) It depends on the value of n.

6.NSO–C.9. Know integer subtraction is the inverse of integer addition; use the number line to model addition and subtraction of integers and add and subtract integers.

6.NSO–C.10. Accurately and efficiently add, subtract, multiply, and divide (with multidigit divisors) whole numbers and positive decimals.

6.NSO–C.11. Use prime factorization to add and subtract fractions with like and unlike denominators.

6.NSO–C.12. Accurately and efficiently add, subtract, multiply, and divide positive fractions (including mixed numbers) with like and unlike denominators. Simplify fractions.

6.NSO–C.13. Calculate given percentages of quantities, and solve problems involving discounts at sales, interest earned, and tips.

Example: Suppose that the cost for a new piano is $5000 and that the piano loses 20% of its current value each year.

a. After how many years will the piano first be valued at less than $500? Show or explain how you obtained your answer.

b. What will the value of the piano be after 16 years? Show or explain how you obtained your answer.

(See also 6.NSO-C.14)

6.NSO–C.14. Solve simple proportion problems using such methods as unit rate, scaling, finding equivalent fractions, and solving the proportion equation a/b = c/d.

6.NSO–C.15. Apply laws of exponents to multiply whole number powers with like bases.

6.NSO–C.16. Understand multiplication of a negative number by a positive integer as repeated addition.

6.NSO–C.17. Apply the Order of Operations for expressions involving addition, subtraction, multiplication, and division with grouping symbols.

Example: What does 1 + 2 – 3 x 4 ÷ 5 equal?

Strand: Number Sense and Operations *(continued)*

ESTIMATION

6.NSO-E.18. Estimate results of computations with whole numbers and with positive fractions, mixed numbers, decimals, and percentages. Determine reasonableness of estimates.

Example: If you started counting your heartbeats at midnight on January 1, 2000, when would you count the millionth beat? The billionth beat?

Strand: Patterns, Relations, and Algebra

6.PRA.1. Use the properties of equality to solve problems using letter name variables.
(e.g., $1/4 + x = 7/12$).

Example: Ralph gets on his bike at 10 A.M. and rides towards his friend's house 9 miles away. At 10:12 A.M. he has ridden 3 miles. If he keeps going at the same rate, when will he arrive at his friend's house?

A. 10:21 A.M.

B. 10:24 A.M.

C. 10:36 A.M.

D. 10:48 A.M.

6.PRA.2. Write and solve one-step linear equations and check the answers.

Example: Use the balance scales below to answer the following question:

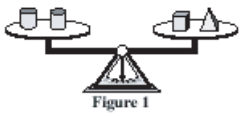


Figure 1

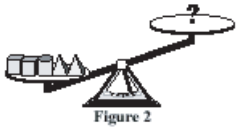


Figure 2

(The first picture has two cylinders on the left and a cube and pyramid on the right.) How many cylinders must be placed on the empty side of the second scale to make that scale balance?

6.PRA.3. Identify and describe relationships between two variables with a constant rate of change (e.g., perimeter-side relationship for a square, distance-time graphs, and conversions such as feet to inches). Contrast these with relationships where the rate of change is not constant.

6.PRA.4. Simplify expressions of the first degree by combining like terms, and evaluate using specific values.

6.PRA.5. Understand that adding or subtracting the same number to both sides of an equation creates a new equation that has the same truth values.

Strand: Patterns, Relations, and Algebra *(continued)*

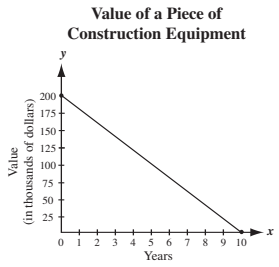
6.PRA.6. Understand that multiplying or dividing both sides of an equation by the same nonzero number creates a new equation that has the same truth values.

Example: What does m *equal in this equation?* 3m + 2 = 17

6.PRA.7. Distinguish between an algebraic expression and an equation.

6.PRA.8. Recognize when information given in a table, graph, or formula suggests a proportional or linear relationship.

Example: The graph below models the value of a piece of construction equipment as it depreciates over 10 years.



How much value (in dollars) does the equipment lose each year?

6.PRA.9. Produce and interpret graphs that represent the relationship between two variables (*x* and *y*) in everyday situations.

Example: Marion wants to rent a bicycle to go out on a lake. The cost is $2.00 plus $1.50 for each hour.

a. Make a table showing how much it would cost to rent a bicycle for 1, 2, 3, and 4 hours.

b. Using numbers, symbols, and the variable n, *write an expression for how much it would cost to rent the bicycle for* n *hours.*

c. Marion has $14.00. What is the greatest number of hours for which she can rent the bicycle? Show your work or explain how you found your answer.

Strand: Geometry

6.G.1. Match three-dimensional objects and their two-dimensional representations (e.g., nets, projections, and perspective drawings).

6.G.2. Identify angles as vertical, adjacent, complementary, or supplementary; provide descriptions of these terms; and use the properties of complementary and supplementary angles and the sum of the angles of a triangle to solve problems involving an unknown angle.

6.G.3. Determine if two shapes are congruent by motions or series of motions (e.g., translations, rotations, and reflections); predict the results of transformations on unmarked planes and draw the transformed figure (e.g., predict how tessellations transform under translation, reflection, and rotation).

6.G.4. Graph points and identify coordinates of points on the Cartesian coordinate plane in all four quadrants.

Example: Based on the data in the table, create a graph that shows the plant's growth over time.

Time (days)	Height (cm)	Change (cm)
0	0	
2	0	0
4	0	0
6	1	1
8	2	1
10	4	2
12	6	2
14	7.5	1.5
16	8.5	1
18	8.5	0
20	9	0.5

(See also 6.PRA.9)

6.G.5. Find the distance between two points on horizontal or vertical number lines.

Example: In the figure below: distance yz *equals distance* zw *and distance* xy *equals distance* yw.

If the distance yz *equals 4, what is the distance* xw*?*

(See also 6.PRA.3).

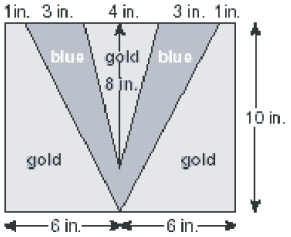
Strand: Measurement

6.M.1. Differentiate between and use appropriate units of measures for two- and three-dimensional objects (i.e., when finding perimeter, area, and volume).

Example: Donna wants to use ready-made 6-foot-long fence sections for her yard. The yard measures 24 feet long and 30 feet wide. How many fence sections would she need to enclose her entire yard?

6.M.2. Find areas of triangles and parallelograms. Recognize that shapes with the same number of sides but different appearances can have the same area.

Example: Use the graphic to answer the question below.



Students at Viking High School decide to have T-shirts made with a blue "V" inside a gold rectangle as shown in the diagram above.

The costs are as follows:

- *plain T-shirt $8.50*
- *blue coloring $0.02 per square inch*
- *gold coloring $0.04 per square inch*

Use the picture and the cost data to answer the following questions:

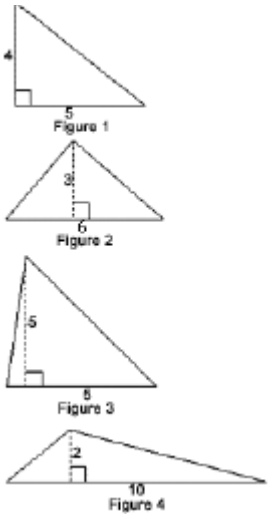
a. What is the area of the blue "V" in the diagram above? Show your work.

b. Explain how you can determine the area that will be colored gold.

c. What will be the total cost for each T-shirt shown above? Show your work.

(See also 6.M.3, 6.M.4)

Example: Which two of the following triangles have the same area?



Strand: Measurement *(continued)*

6.M.3. Develop strategies to find the area and perimeter of complex shapes (e.g., subdividing them into basic shapes such as quadrilaterals, triangles, circles).

Example: Show how to find the area of the isosceles trapezoid by decomposing and rearranging it into a rectangle with the same area.

6.M.4. Solve problems involving proportional relationships and units of measurement (e.g., same system unit conversions, scale models, maps, and speed).

Example: A garden snail can travel about 5 feet in 2 minutes. At this speed, how far can it travel in one hour?

(See also 6.M.8)

6.M.5. Understand the concept of volume; use the appropriate units in common measuring systems (e.g., cubic inch, cubic centimeter, cubic meter, cubic yard) to compute the volume of rectangular solids, including rectangular prisms.

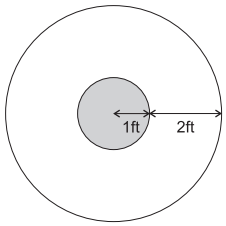
Example: When you order sand from the quarry, it comes in units of cubic yards. How many cubic yards do you need to fill a sand box that is 12 feet by 9 feet and 6 inches deep?

(See also 6.M.1, 6.M.8)

6.M.6. Identify, measure, describe, classify, and construct various angles, triangles, and quadrilaterals; measure the interior angles of various polygons.

6.M.7. Understand the concept of the constant π; know the formulas for the circumference and area of a circle. Use the concepts to solve problems.

Example: Julie designed a target computer game. On her computer screen, the circular targets look like the circular areas shown below.



If the computer randomly generates a dot that lands within the circular areas, what is the approximate probability that the dot will land in the ***shaded*** *area?*

(See also 6.DASP.6)

6.M.8. Know and use the formulas for the volumes and surface areas of cubes and rectangular prisms, given the lengths of their sides.

Example: Storage boxes are cube shaped and measure 4 inches on an edge. How many of these storage boxes are needed for 300 small cubes, 2 inches on an edge?

(See also 6.NSO-E.18)

6.M.9. Find the sum of the angles in simple polygons (up to eight sides) with and without measuring the angles.

Strand: Data Analysis, Statistics, and Probability

6.DASP.1. Describe and compare data sets using the concepts of median, mean, mode, maximum and minimum, and range.

Example: So far this term, Heidi has these scores on quizzes: 87, 86, 96, 87. What is the lowest score she can get on the one remaining quiz to have a final average (mean) score of 90?

6.DASP.2. Construct circle graphs using ratios, proportions, and percentages.

6.DASP.3. Construct, label, and interpret stem-and-leaf plots.

6.DASP.4. Use tree diagrams and other models (e.g., lists and tables) to represent possible or actual outcomes of trials.

Examples: Create the line plot that corresponds to the information in the following tally chart.

Plan Height Data	
Height (CM)	Number of Plants
15	I
20	IIII
22	II
23	IIIIIII
40	I

6.DASP.5. Represent two numerical variables on a scatterplot, and describe any apparent relationship that exists between the two variables (e.g., between time spent on homework and grades in class).

6.DASP.6. Compute probabilities of events from simple experiments with equally likely outcomes (e.g., tossing dice, flipping coins, spinning spinners) by listing all possibilities and finding the fraction that meets given conditions. Analyze the outcomes.

Example: A bag contains 2 blue, 6 black, and 4 white socks. Paula is going to draw out a sock without looking in the bag. What is the probability that she will draw either a blue or a black sock?

6.DASP.7. Use appropriate ratios between 0 and 1 to represent the probability of the outcome and associate the probability with the likelihood of the event; know that 0 probability means an event will not occur and that a probability of 1 means an event will occur.